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ABSTRACT

Through a historical picture of school allocation and residential change, and a detailed comparison of residential and school-based social segregation over time, this paper examines the relationship between residential differentiation and school segregation in the United Kingdom, describing the extent to which introduction of market principles, and the way schools and local education authorities (LEAs) have responded, have changed pre-existing between-school socioeconomic segregation. It also discusses whether school segregation is greater in areas with greater residential differentiation and notes how resulting disparities between school segregation levels and residential differentiation can be explained. Researchers used a segregation index, which computed the strict exchange proportion of disadvantaged students who would have to move between schools or districts in order for there to be no segregation by disadvantage. Data came from the number of children qualifying for free school meals for every secondary school in England in the years 1989-99. Overall, the relationship between levels of residential differentiation and school segregation was relatively strong. There was great variation in the significance of this relationship across LEAs. Schools were becoming more socially divided, mainly because of the socially divided nature of housing. (Contains 49 references, 13 figures, and 4 tables.) (SM)

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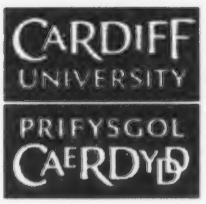

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'Local schools for local children' and the role of residence in segregation

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2001

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'Local schools for local children' and the role of residence in segregation

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Abstract

The Schools Standards and Framework Act 1997 has weakened the role of the market in secondary education, and strengthened the ability of Local Education Authorities to revert to the use of catchment areas (or distance criteria) in allocated school places. Many of our LEA respondents want to revert to a policy of 'local schools for local children'. They are concerned more with balancing numbers between schools than with the nature of those intakes. What are the implications for the school systems of England and Wales? Through a historical picture of school allocation and residential change, and a detailed comparison of patterns of both residential and school-based social segregation over time, this paper shows how important the link is between area of residence and the socio-economic composition of local schools. In light of this we can make some predictions about future changes in the nature of schools. After a decade of increasing social comprehensivisation in terms of poverty and ethnicity, schools are now becoming more socially divided chiefly because of the socially divided nature of housing.

Introduction

The introduction of the 1988 Education Reform Act and other legislation increasing the right of families to choose schools for their children has led to concern among some commentators that

schools in England and Wales would become more socially segregated (Ball 1993, Ambler 1997, Conway 1997). Different writers use different terms in which to express this fear. Some refer to 'polarisation' and others to 'stratification', 'white-flight', 'ghettoisation' or simply increasing inequality of access or opportunity. Whatever the terms used the condition would be characterised by an increasing separation of socio-economic groups, with more disadvantaged sections of the society concentrated in using some schools, and more advantaged sections concentrated in others.

However, analysis of the composition of the intakes of all English and Welsh secondary school over 12 years reveals a more complex picture (Gorard 2000a, 2000b). There has, in general, been a decline in socio-economic segregation between schools at both primary and secondary level, and as measured by poverty, ethnicity, first language, and additional educational needs (Gorard and Fitz 2000a). In terms of all of these indicators schools are now more mixed than they were, despite the concurrent impact of market forces in education. In fact there are some suggestions that the desegregation is an impact of market forces - that school choice, far from separating social groups, actually allows them to mix. From 1989 to 1994 between-school segregation assessed by poverty declined markedly, plateauing out until 1997. From 1998 onwards there has been a small rise. Therefore the sharpest drop occurred during the period of increasing marketisation, and the recent rise occurred after the change of administration and the introduction of constraints through legislation such as the School Standards and Framework Act 1998. Of course, these apparent associations may be coincidences, and we have suggested elsewhere a number of alternative explanations for these powerful social movements (Gorard et al. 2001, White et al. 2001).

All of these potential explanations are being pursued, and many have been found to be at least partial contributory determinants of the patterns we have uncovered. Among these are patterns of school closures, variations in diversity among local schools, variations in local school allocation procedures, the decline of selection, increasing numbers of appeals, and increasing indicators of poverty. One factor that we keep returning to, and which appears to underlie both current and previous segregation in schools is the pattern of local residential differentiation. This paper focuses on that one factor, and considers in more detail than we have previously, the relationship between patterns of schooling and patterns of housing.

Apart from the fee-paying boarding sector, schools typically serve local areas (Gorard 1997, Taylor 2000). Such areas vary in size - with fee-paying day schools, foundation schools, voluntary-aided church schools, and *ysgolion Cymraeg* often taking students from a larger 'catchment' than community schools - but ultimately access to day schools are controlled by distance from home. Consequently, schools educate particular communities based around their location, and so their intake reflects the variety, nature and cost of local housing. This is most obvious where schools have formal catchment areas from which they draw pupils, a very typical situation between 1960 and 1988 (Dore and Flowerdew 1981), and increasingly again today since 1998 (the ERA 1988 made the use of catchments almost impossible). The same occurs in instances where schools are oversubscribed and 'distance' criteria are applied to allocate places (White et al. 2001). As a result the composition of intakes are and always have been, even from 1988-1997, highly related to the residential characteristics of their locale. Since the Education Reform Act 1988 there has been a progressive rise in the use of schools further away from home, presumably as a result of choice policies among other factors. However, as was also indicated (but not reported) by the Smithfield study in New Zealand (Waslander and Thrupp 1995, Gorard and Fitz 1998a), out-of-catchment schools are now more frequently used by children who live in 'struggling' or 'aspiring' than in 'prosperous' neighbourhoods (Parsons et al. 2000). Thus, despite predictions from many academics that the obverse would happen, middle-class parents are not apparently making more use of parental choice, perhaps reflecting greater dissatisfaction with *local* schools among those in poor areas.

The geography of residential development in the UK has a particular history which makes it distinct to that of the US or other European countries. The urban landscape in particular has grown and changed via a particular blend of public and private residential development, resulting in a mosaic of housing markets within towns and cities. Urban growth over the last 150 years in the UK has come alongside major developments to the education system. Developments via the investment of the state in both areas have also tended to come at similar times over that period ensuring that their histories are intertwined. Hence differentiation in the urban geography of towns and cities is highly related to differentiation in the composition of school intakes.

The link between residential differentiation and school intakes is not new. For example, there have been many studies that have considered the 'neighbourhood effect' on school performances (e.g.

Wilson 1959, Robson 1969). But few have made the direct empirical link between residential differentiation and school segregation (although see Dole and Flowerdew 1981 on the difficulties of achieving truly comprehensive intakes in local Derby schools). The purpose of this paper, therefore, is to examine the relationship between residential differentiation and school segregation. Only by identifying the degree to which school compositions are segregated based on residential differentiation, so separating it out, can we really begin to measure the impact of any education policy on school intakes. In the context of current reforms:

- To what extent has the introduction of market principles, and the way schools and LEAs have responded, changed pre-existing between-school socio-economic segregation?
- Is school segregation greater in areas with greater residential differentiation?
- And how can resulting disparities between levels of school segregation and residential differentiation be explained?

Background

In *themselves*, according to our evidence (Gorard 2000a), market forces in education do not appear to either segregate or desegregate the composition of schools, although it should be stressed that our evidence generally focuses on changes in the distribution of the least advantaged sections of society (and it remains possible that different processes are at work among wealthier or more privileged families). Despite the previous lack of large-scale research concerning the impact of markets in education there is general agreement that the specific nature of any choice programme is part of what determines its results (Weiss 1996). Their actual impact may also depend significantly on the status ante. In an education system which is totally segregated, as happened in South Africa in terms of ethnicity under the apartheid regime (MacGregor 1999), opening the possibility of choice can lead to rapid desegregation. In an education system committed to desegregation, as happened with the US bussing policy in some states, the change to a system of choice can lead to rapid segregation (compare also the 'white flight' in the Netherlands). Britain in the 1980s, on the other hand, had a comprehensive system of schooling but one in which places at school were allocated strictly by area of residence. The student intake at comprehensive schools reflected the nature of the local housing, and there were consequently wide variations between schools. In a society of the form

envisaged on a small-scale at Poundbury in Dorset in which different types and costs of houses are mixed in small communities, then a policy of residential allocation to school *could* lead to mixed intakes in socio-economic terms. Britain is not such a society, and the relatively stratified nature of its schooling is at least partly a consequence of the relatively stratified nature of its housing. It is therefore likely that socio-economic changes are more significant in producing changes in segregation than educational processes are. Some pressure groups, such as Demos/Comedia and the Institute of Public Policy Research wish to extend real choice of schools to the socially excluded, and realise that to do so requires a fuller consideration of the role of housing in school allocation. Their preference is thus for mixed housing schemes providing enough residences in each area affordable to all (Sutcliffe 2000).

The intriguing possibility is that one of the actual determinants of residential differentiation has actually been its implications for school-based segregation. Although the intake to schools is clearly linked to the nature of nearby residences, the desirability of residences is partly measured by the nature of the intake to the nearby school. Any estate agent in the UK would attest to this. The rising cost of property in desirable catchment areas (the school 'premium' on house prices) is reinforcing the impact of both private and public housing estates in leading to selection by postcode and, therefore, educational 'ghettoisation' (Association of Teachers and Lecturers 2000). If this catchment area link was weakened, even slightly, during the 1990s by a programme of school choice, then perhaps residential segregation has also declined over time creating a circle of integrating forces? This is what Taeuber et al. (1981) describe as the 'Belfast' model. Using a proportionate index of dissimilarity equivalent to the segregation index used in our own work, Tauber et al. found some evidence that residential segregation by ethnicity declined in Kentucky following the increasing integration of schools. A similar phenomenon was hypothesised by Goldhaber (2000) who suggested that, paradoxically, by increasing choice in urban areas one can actually reduce white flight (residential segregation) as parents no longer need to move away from city centres in order to use suburban schools. It is certainly the case for a variety of reasons (the nature of travel etc.) that geographical location is the key to understanding the impact of choice on the school system (Herbert 2000).

Serious inequities already exist in the residential-base system, partly because many parents choose houses with schools in mind according to Goldring and Hausman (1999). Therefore, 'research

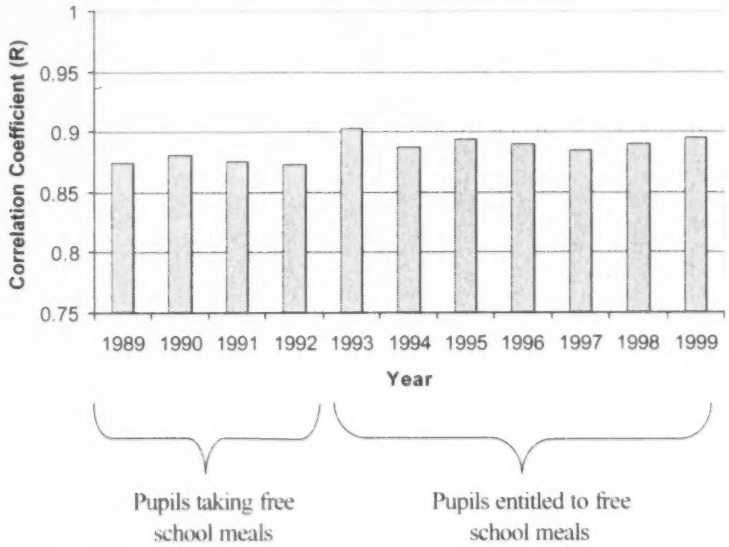
comparing the distribution of students by social class in a system of choice to the social class distribution that would have existed based solely on neighbourhood school assignment is clearly needed' (p. 497).

The discussion here continues by outlining a general chronology of urban development and education development. The paper then presents the results of an examination of the relationship between levels of residential segregation (based on unemployment in this analysis) and levels of school segregation (based on student entitlement to free school meals) for all Local Education Authorities in England.

Clearly the number or frequency of unemployed adults in any area is also highly related to the number or frequency of pupils entitled to free school meals. Figure 1 illustrates the correlation between the proportion of unemployed economically active adults in every LEA as recorded in the 1991 UK Census, and the proportion of secondary pupils in each LEA who are recorded as either taking (until 1993) or entitled to free school meals. As Figure 1 shows the correlation is large, as one would expect, and differentiates between the accuracy of the free school meal data. Between 1989 and 1992 the school figures are for the proportion of pupils *taking* free school meals, whereas from 1993 onwards the figures are based on the number of pupils *entitled* to free school meals. As expected the relationship between unemployment and free school meal entitlement is stronger than it was with pupils actually taking free school meals.

It should be noted that we are concerned here primarily with segregation, that is the distribution of particular minority groups between areas and between schools. Of interest here is not the overall levels of poverty in schools and residential areas, but how such poverty is distributed across LEAs (or any other areal unit, see forthcoming Working Paper 40 for an examination of the modifiable areal unit problem).

Figure 1 - Correlation between the proportion of adults unemployed in 1991 and proportion of secondary school pupils with free school meals 1989 to 1999



A brief history of residential differentiation and school reforms

Geographers and sociologists have long been interested in the patterns of residential development in urban areas. The traditional approach to this have been in studies on the factorial ecology of cities (see Davies 1984). British cities represent a distinct ecological structure, largely as a result of the large public housing sector (Herbert and Thomas 1990). They are typically characterised by distinct neighbourhoods, each with their own socio-spatial dialectic. This is largely a product of the relationship between housing sub-markets and social class. As Dennis and Clout (1980) have argued, different social groups live in distinct areas of the city and that such variations *between* areas cannot be ignored, even in light of growing variations *within* neighbourhoods (Reynolds 1986). Such residential differentiation can determine more than variations in housing since 'the social geography of the city is itself likely to generate or reinforce differences in values from one neighbourhood to

another, for the sociodemographic composition of different neighbourhoods creates distinctive local reference groups which contribute significantly to people's attitudes to life' (Knox 1995, p. 62). The role of schools and education in urban, and even rural life, plays its own part in generating and reinforcing different values between neighbourhoods. Indeed, many schools have been built or been part of creating neighbourhoods, as they provide significant points of community contact (Davies and Herbert 1993). As Robson (1969) discovered in a study in Sunderland, parental attitudes towards education were strongly affected by the character of their residential neighbourhood. Wilson has also stressed the link between residential differentiation and schooling, 'the *de facto* segregation brought about by concentration of social classes in cities result in schools with unequal moral climates which likewise affect the motivation of the child, not necessarily by inculcating a sense of inferiority, but rather by providing a different ethos in which to perceive values' (1959, p. 845).

Typically many studies are concerned with the relationship between residential characteristics and school outcomes. For example, Glass (1948) found that when working-class families in Middlesborough were moved to a *new* local authority housing estate there was a measurable increase in the proportion who achieved grammar school places. The newer field of school effectiveness is based upon a consideration of local socio-economic characteristics and school outcomes (Goldstein et al. 2000, Gorard 2000c) and studies infallibly reveal a close relationship between the two. Several commentators therefore believe that the use of raw-score indicators of school attainment (popularly 'league tables') within a system of school choice will reinforce the segregation in the school system pre-existing due to the use of residential-based catchment areas (Foxman 1997, Hardman and Levacic 1997, see also Gorard and Taylor 2001).

Since the relationship between residential differentiation and school segregation appears to operate as a two-way process via the housing and school 'markets', these have generally developed in parallel over time. In the UK, residential growth over the last 150 years has evolved simultaneously with school development. This historical linkage between urban growth and education reforms provides a context in which to examine the current relationship between residential differentiation and school segregation.

Table 1: Urban growth and education reforms in the UK, 1850 to 1980.

Year	Urban growth	Education reforms
1850	• Overcrowded, industrial towns and cities. • Poor quality & high density (later cleared). • Rented from private landlords.	• Major development of schools. Two forms: i. Sponsored and ran by religious community ii. Endowed schools • Most located in wealthy suburbs. Some religious schools in poor inner city areas.
	1875 Public Health Act • Introduced better quality terrace estates around inner city for working class families. • New residential districts on edge of towns & cities for white-collar workers. Typically owner occupied.	*1870 Education Act* • School Boards introduced. Provided first state schools. • Varied fees for these schools.
1900		*1902* • School Boards replaced by LEAs. • Introduced their own grammar schools.
	1919 Housing Act (Addison) • First estates of good quality 'cottage-style' semi-detached housing. • Construction fell short of targets due to high costs.	
1930s	• 3/4 storey flats on first council estates. Built for families moved from inner city slums. • Private-rented accom. fell from 81% to 58% between 1918 and 1938. • Owner-occupied accom. began to rise from 10% to 30% between 1918 and 1938. Usually in semi-rural locations and built by speculative builders.	*1944 Education Act* • Enabled free education • Tripartite system: i. Grammar Schools ii. Technical Schools iii. Modern Schools
Post-war	• Council low-rise multi-family units on large estates on periphery of cities. • Extensive waiting list meant that first estates housed the poorest and most needy families.	• Comprehensive schooling proposed. • First comprehensives were built in areas in which existing grammar schools would be unaffected. Typically these were New Towns and in the new post-war peripheral council estates.
1960s	• Maisonette and high-rise council flats built in inner-city and slum clearance sites of towns & cities.	*Circular 10/65* • LEAs required to produce a Comprehensive review of their education system.
1968	• Low rise, small-scale housing schemes. End of large-scale council housing construction. • Middle-class estates continue to be built on suburbs of towns & cities.	
		1976 Education Act • Comprehensive schooling formalised

Table 1 provides a brief outline of major urban residential developments and school reforms over time. From this brief history of urban and school reforms it can be seen that there were many parallels in urban and school development. One major development in education came in the last quarter of the nineteenth century and relied heavily on voluntary sponsors to fund it. Consequently many of these early schools were built in wealthy areas. There were some religious schools built in the very inner parts of towns and cities for the poorest sections of society, but these were modest in number. The introduction of School Boards in 1870 was the first step in providing state schools, however, these schools were not entirely free. Fees were introduced at varying rates, and, as Marsden (1986) suggests, these were fixed in order to keep schools socially segregated. Across the whole education system a social hierarchy of schools was beginning to emerge by 1900, with the upper classes sending their children to public schools, middle-class boys attending endowed grammar schools, and working-class children having little option other than to attend the more affordable School Board elementary schools (Ball 1986).

Since towns and cities were still small in size there was probably little spatial segregation of schools at that time. It was rather the cost of attending school which led to socio-economic and class segregation. The introduction of the tripartite system in 1944 may have done little to improve this situation. According to Ball (1986) middle-class children were consistently over-represented in Grammar schools and working-class children were over-represented in Modern schools.

The next major stage in school development was after 1950 with the introduction of comprehensive schools, implemented apparently to increase equality of opportunity for all children. This produced the last major increase in school numbers of the last half of the twentieth century (Figure 2). The growth of comprehensive schools is illustrated in Figure 3, and shows their significant impact on the education landscape during the 1960s. A survey by Benn and Simon (1970) suggests that by 1968 27% of comprehensive schools were purpose-built. This varied across the country, such that in London 46% of their sample comprehensive schools had been purpose-built.

Figure 2: Number of secondary schools 1950 to 1997, England and Wales

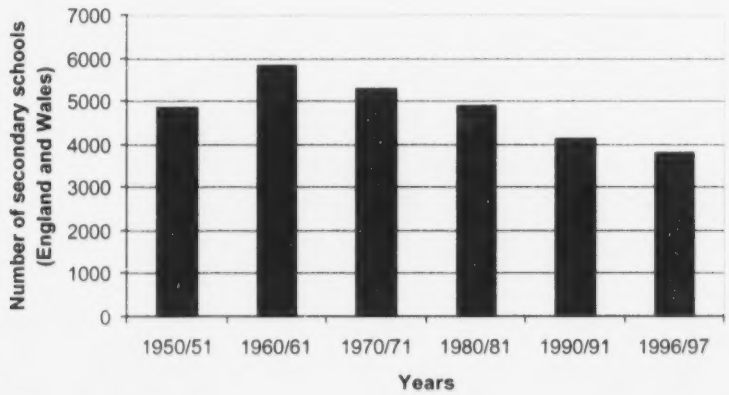
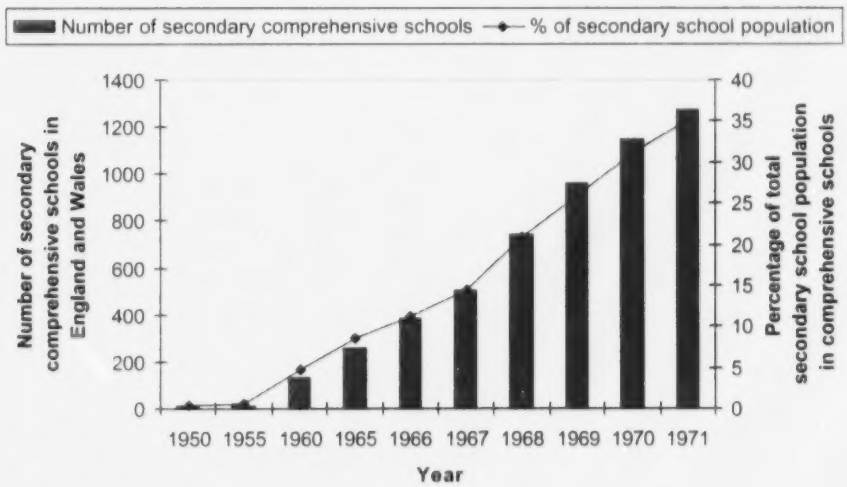


Figure 3: Growth of comprehensive schools 1950 to 1971, England and Wales



As these new schools were being built the state was having to create large-scale council house estates on the periphery of cities or the development of New Towns in order to meet the growing demand for housing. This led to a two-fold pressure on school segregation. First, new comprehensive schools were needed most in New Towns and the large peripheral council estates. And second, as cities became larger the spatial segregation of schools grew making it difficult for

schools to draw pupils from other areas of the towns and cities in order to have a socially balanced intake. As Benn and Simon (1970) reported, the severest obstacle to the notion of the 'community school' was the inequality and class segregation of large urban areas, as this prevented a balanced community mix.

The situation was not helped by the fact that during the first stages of comprehensive schooling new schools were discouraged in areas which already contained grammar schools – the inner cities and wealthy suburbs (HMSO 1958). Even when, in the latter stages of this reorganisation of schooling, Grammar schools were converted to comprehensive status many retained their grammar ethos and reputation. An obvious example of this was in the greater likelihood that ex-Grammar schools would have sixth forms (Kerkchoff et al. 1997).

The parallel development of residential areas and school reforms mean that segregation between schools has always existed. However, it is not clear to what *extent* this occurred until very recently. Some indication is given by Benn and Chitty (1996). They report that at the peak of the comprehensive process (1968 perhaps) 62% of comprehensive schools mainly drew children from council housing estates or areas with mixed housing with a substandard element. By 1994 this had fallen back to 31% of comprehensive schools. What is unclear from this is whether this figure is lower because comprehensive schools have more socially mixed intakes or whether residential differentiation itself has fallen.

A more meaningful way to understand the relationship between residential differentiation and school segregation is to compare LEAs. As presented in Gorard and Fitz (2000b), levels of school segregation vary significantly across the authorities of England and Wales. To what extent can these variations be explained by their respective levels of residential differentiation? If residential differentiation can account for some of the variation, then what other factors contribute to school segregation? In order to answer these questions it is necessary to measure levels of residential differentiation and school segregation. The next section of this paper outlines the methods used to do this before going on to present our preliminary results.

Methods used

Segregation is a complex concept, and many different ways have been suggested to measure it. Some have elected to use pupils' home postcodes (see Gibson and Asthana 2000). After considerable investigation we have elected to concentrate our analysis on the 'segregation index' (Gorard and Fitz 1998b) because of its important advantages in terms of compositional invariance (Taylor et al. 2000, Gorard and Taylor 2000). This index computes the strict exchange proportion of disadvantaged students (or residents) who would have to move between schools (or districts) in order for there to be no segregation of disadvantage (although it should be noted that the findings below are substantially unchanged through the use of alternative approaches such as the dissimilarity index).

Table 2 - Basic segregation table

	Disadvantaged	*Advantaged*	*Total*
School 1	A1	B1	C1
School 2	A2	B2	C2
....			
School n	An	Bn	Cn
Total	A	B	C

For a region with n sub-areas in which segregation may take place, where A and C are defined by Table 2, and where i varies from 1 to n, the index of dissimilarity may be defined as:

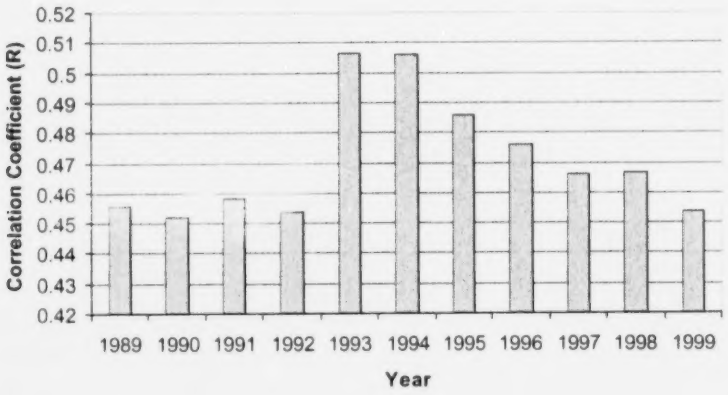
S = 0.5 * (|Ai/A – Ci/C|).

To calculate levels of between-school segregation we obtained the number of children with free school meals from the DfEE for every secondary school in England and for every year between 1989 and 1999. Free school meals are only available to school children from very low income families (family income support being the only criterion during this period). As already mentioned, the recording of these children changed in 1993 to take into account children who were eligible for, but who did not take, free school meals. Since this school indicator of socio-economic segregation is based on families with low levels of income it was decided to use the number of unemployed adults

as the indicator of residential differentiation. In precise terms this included the number of males aged 16 to 65 and the number of females aged 16 to 60 who were economically active but who were reported to be unemployed in the 1991 UK Census. In order to calculate segregation, organisation units, or spatial units, are required. In the case of the educational measure schools provide the obvious unit from which to measure segregation. For residential segregation the choice of unit is more complicated (see 'modifiable areal unit problem' as discussed by Openshaw 1984, Wrigley 1995). For ease, above all else, the 1991 enumeration districts (ED) were chosen as the organisation units for the residential differentiation measure (and then aggregated to LEA or school catchment level as appropriate).

As Figure 1 illustrated, the levels of children *entitled* to free school meals more closely resembled the levels of unemployed adults than the levels of children *taking* free school meals. A similar pattern can be seen in Figure 4 which illustrates the correlation coefficients between the levels of school segregation over time and the 1991 levels of residential differentiation. Even though the earliest date for free school meal entitlement was 1993 it was therefore decided that this set of data would be used to compare against the 1991 levels of unemployment.

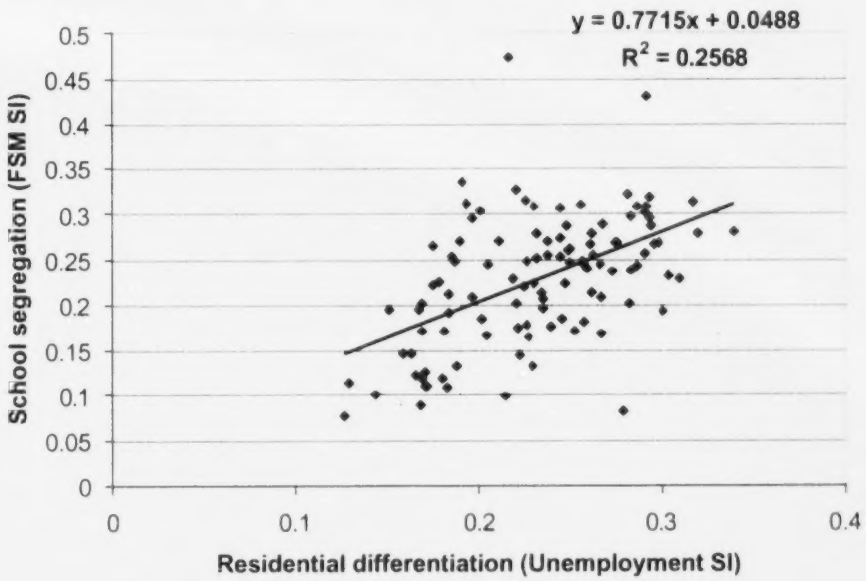
Figure 4: Relationship between 1991 residential differentiation (unemployment) and 1989-1999 school segregation (FSM)



Residential differentiation and school segregation

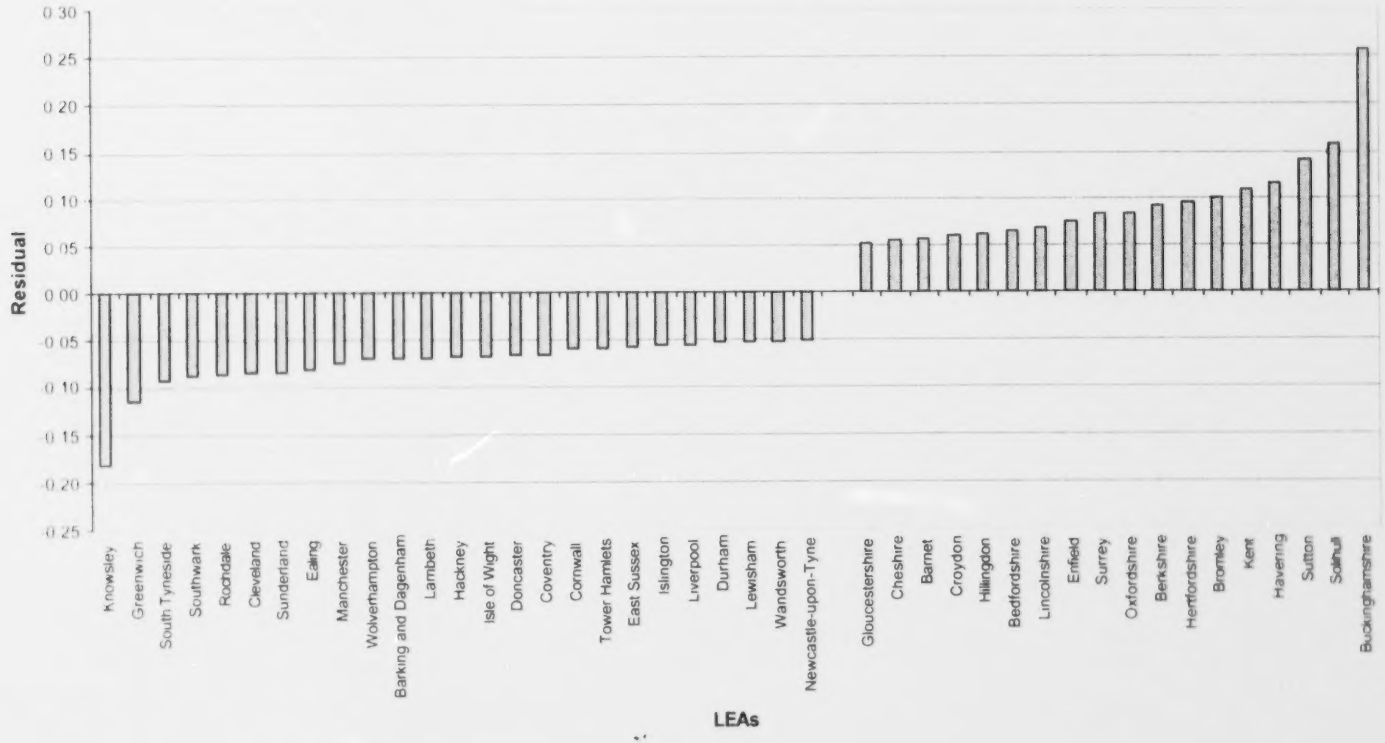
The relationship between levels of residential differentiation (unemployment) and school segregation (FSM) is relatively strong. Figure 5 illustrates the two measures by LEA. There is an observable relationship between school segregation and residential differentiation. However, there are several LEAs which either have high residential differentiation but low school segregation or low residential differentiation but high school segregation. Using the line of best fit estimating the levels of school segregation based on the levels of residential differentiation, residuals were calculated for each area. Those LEAs with more than ±0.05 segregation index points from their actual levels of school segregation are given in Figure 6.

Figure 5: Scatterplot of LEA measures of school segregation and residential differentiation



At the two extremes are Buckinghamshire and Knowsley LEAs. In Buckinghamshire the distribution of unemployed adults by ED produced a segregation index score of 0.22. Based on Figure 5 the segregation index score for FSM in schools should be around 0.23.

Figure 6: LEAs with large residuals based on estimation of school segregation (FSM) from residential differentiation (unemployment)



However, in reality the levels of school segregation are much higher, producing a score of 0.47. Knowsley contrasts quite markedly with Buckinghamshire. Knowsley has greater residential differentiation than Buckinghamshire (segregation index = 0.28), which in turn would suggest that school segregation would be greater than that in Buckinghamshire (estimated segregation index = 0.30). However, the actual level of school segregation was significantly lower (segregation index = 0.08). The patterns of segregation between schools in each of these two LEAs can be seen by comparing figures 7 and 8.

The overall levels of segregation between schools contrast quite markedly between the two LEAs. For example, some of the schools in Buckinghamshire have six times more pupils eligible for free school meals than the LEA average. Also, over time, segregation in the Knowsley schools declines while segregation in the Buckinghamshire schools continues to remain high throughout the 1989-1999 period. The intakes of the Knowsley schools appear to be moving towards convergence, or homogeneity, over the eleven year period.

Around a quarter of the variation in school segregation can be accounted for by the levels of residential differentiation found in each LEA alone (R squared for the simple regression model). Even though there is residential differentiation in Knowsley the school intakes are, according to the FSM measure of segregation, very mixed. Whether this phenomenon is related to the introduction of market reforms, or open enrolment, into the education system is still unclear. The next section of this paper examines how other characteristics of the education system in each LEA could also contribute to school segregation.

Figure 7: Segregation ratios for schools in Buckinghamshire, 1989 to 1999

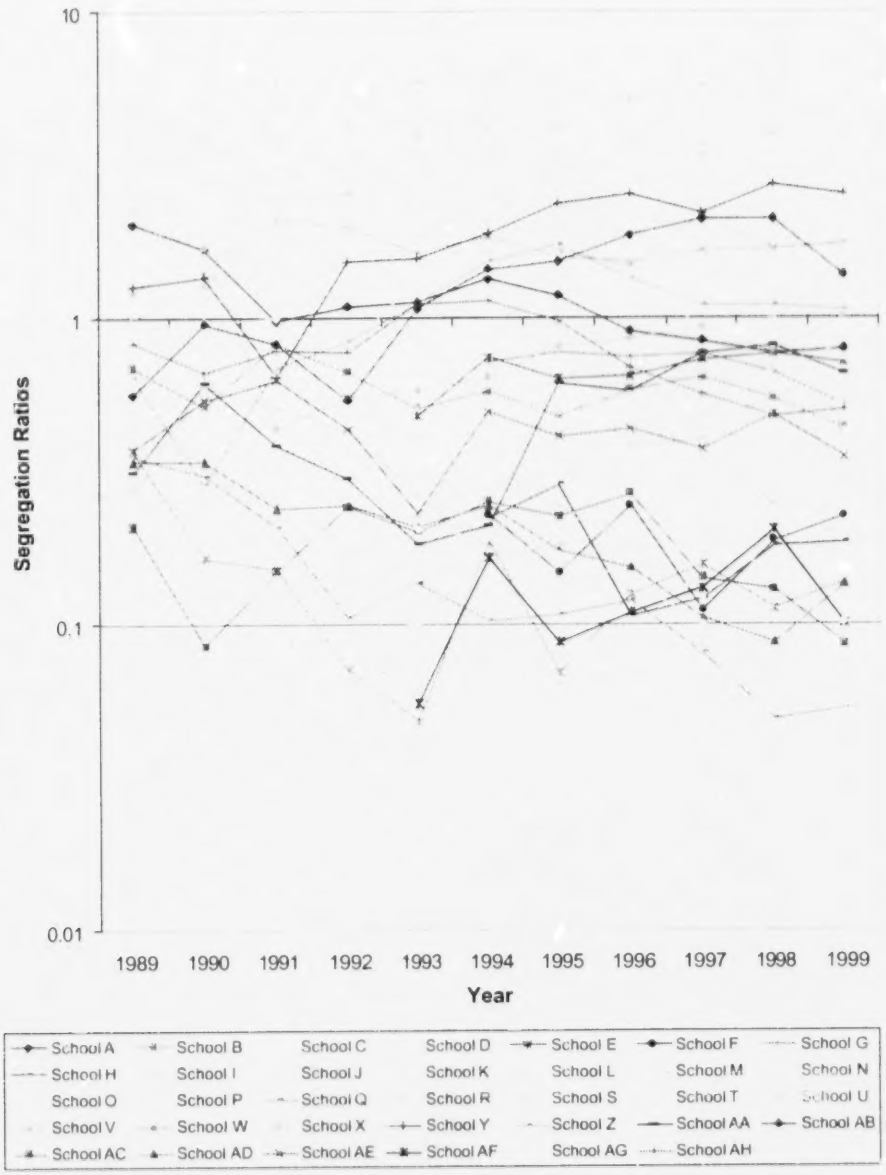
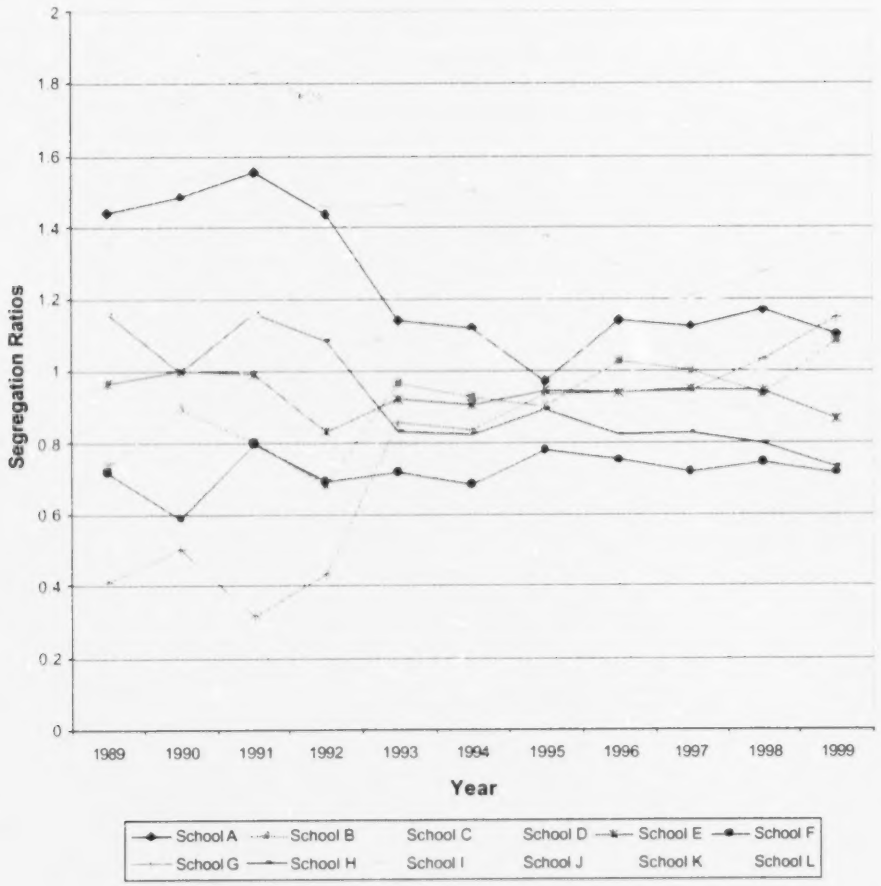


Figure 8: Segregation ratios for schools in Knowsley, 1989 to 1999



School segregation, residential differentiation and school diversity

A key feature of those LEAs which had greater school segregation than their respective levels of residential differentiation would have suggested is that they retain grammar schools. As discussed earlier, the location of grammar schools do not necessarily reflect the socio-spatial nature of towns and cities. However, as evidence has suggested throughout the twentieth Century, grammar schools have tended to be more the preserve of the middle-classes. Here are the results of a

multiple regression analysis to explain school segregation that accounts for existing residential differentiation and the presence of grammar school places in each LEA.

Dependent variable:

School segregation (FSM), 1993

Predictors:

(Constant)

Residential differentiation (Unemployed), 1991

Secondary Grammar schools as a % of total secondary schools

Results:

$R = 0.658$ $R^2 = 0.433$

Using the presence of grammar schools alongside residential differentiation significantly improves the prediction of school segregation (compare Figure 4). The coefficients from this regression model are given in Table 3.

Table 3 - Coefficients for regression analysis (A)

	Unstandardised coefficient	**t**	**Significance**
(Constant)	0.02516	0.889	0.376
Residential differentiation (Unemployed), 1991	0.816	6.849	0.000
Secondary Grammar schools as a % of total secondary schools	0.00396	5.298	0.000

Some of the schools that were converted from grammar school status to comprehensive status may have retained their grammar ethos, and to some extent their desirability. Many of these became self-governing Grant Maintained (GM) and then Foundation schools during the 1990s.

Similarly, some denominational and voluntary-aided schools have tended in the past to maintain forms of indirect selection of students. A more complex regression model would incorporate such school diversity, and produces quite different results.

Dependent variable:

School segregation (FSM), 1993

Predictors:

(Constant)

Residential differentiation (Unemployed), 1991

Secondary Grammar schools as a % of total secondary schools

Secondary GM schools as a % of total secondary schools

Secondary VA schools as a % of total secondary schools

Additional Educational Needs (AEN) index of deprivation

Pupil:area density

Results:

$R = 0.793$ $R^2 = 0.629$

Using this model of regression just over 60% of the variation in school segregation can be explained by the independent variables. The coefficients in Table 4 suggest that school segregation is higher in LEAs with high residential differentiation, with a presence of Grammar schools, GM and VA schools, with high pupil density, and with low overall levels of deprivation.

The latter two variables are of some interest since they may be inversely related to one another. Generally, LEAs with high pupil densities, such as metropolitan or London Boroughs, have high levels of deprivation. However, in the regression model for school segregation there is a distinction made between urban LEAs with low overall levels of deprivation and urban LEAs with high overall levels of deprivation, the latter group more likely to have lower school segregation. A

similar distinction can be made between relatively wealthy and poor rural LEAs, the latter LEAs most likely to have low school segregation.

Table 4 - Coefficients for regression analysis (B)

	Unstandardised coefficient	t	Significance
(Constant)	0.144	4.100	0.000
Residential differentiation (Unemployed), 1991	0.644	5.316	0.000
Secondary Grammar schools as a % of total secondary schools	0.001912	3.154	0.002
Secondary GM schools as a % of total secondary schools	0.0007007	2.658	0.009
Secondary VA schools as a % of total secondary schools	0.001055	1.715	0.090
AEN	-0.09402	-5.260	0.000
Pupil:area density	0.0001325	1.660	0.100

Even though these variables can account for approximately 60% of the variance in school segregation by LEA there still remains a good deal of 'unexplained' school segregation. Using the coefficients from Table 4 the residuals of the regression model can be calculated (Figure 9). Knowlsey and Buckinghamshire LEAs remain at the two extreme ends of the residuals (see earlier).

In terms of change in segregation between schools for these residual LEAs no pattern of convergence or divergence over time appears to exist (Figure 10). In the majority of these LEAs between-school segregation fell over the 11 year period despite their 'over' or 'under' levels of school segregation as predicted by their respective circumstances.

Figure 9: LEAs with large residuals based on estimation of school segregation (FSM) from residential differentiation (unemployment), Grammar schools, GM schools, VA schools, AEN and Pupil:area density

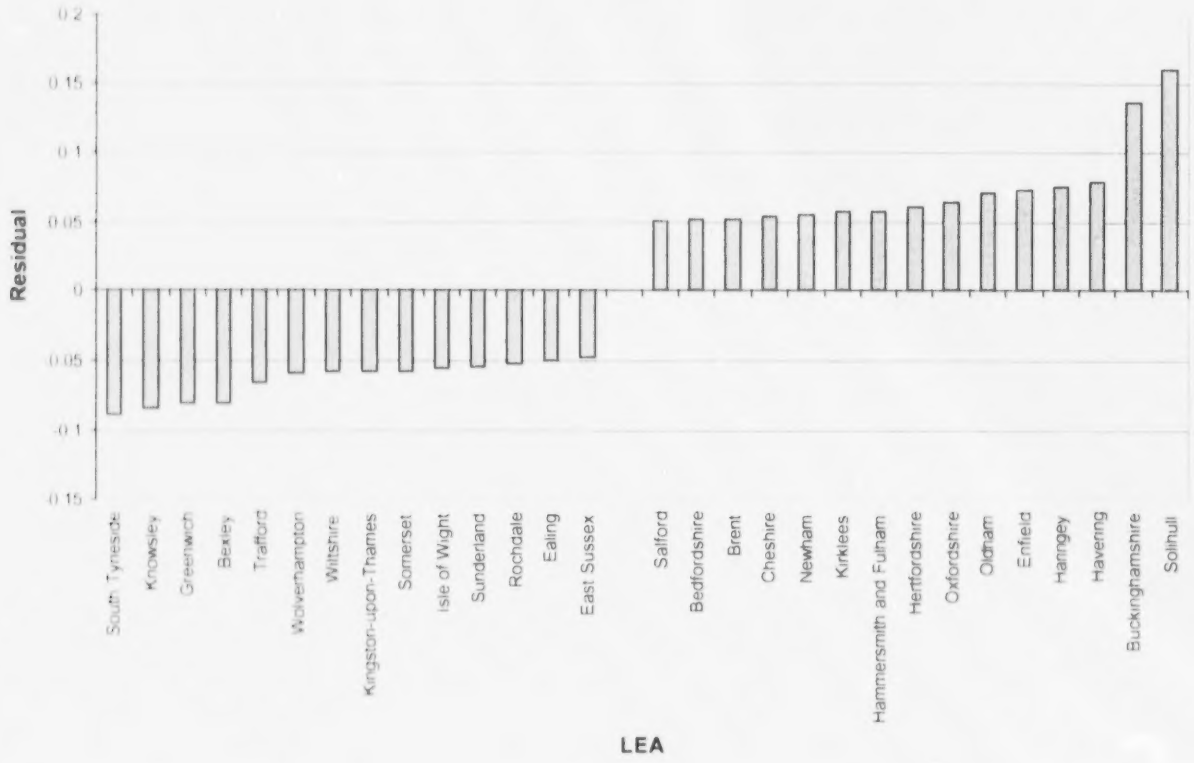


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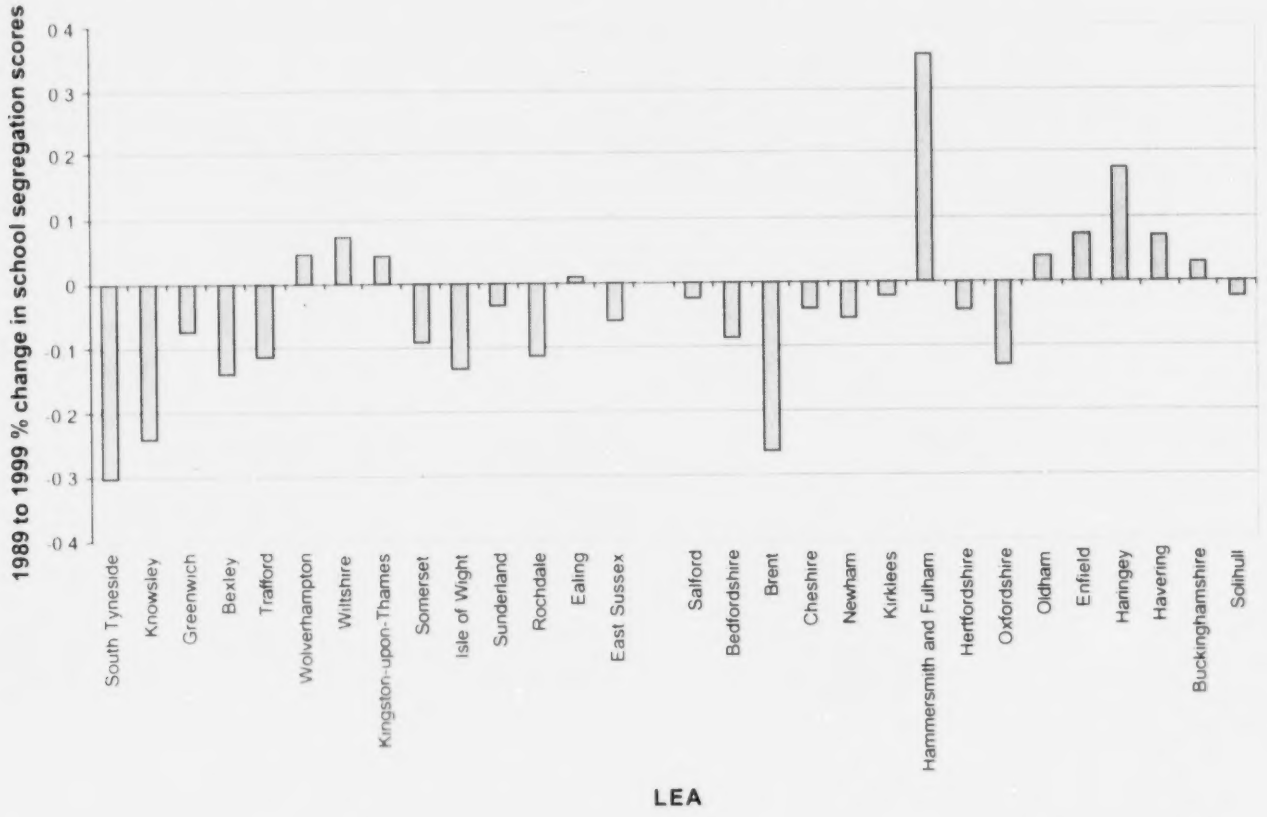
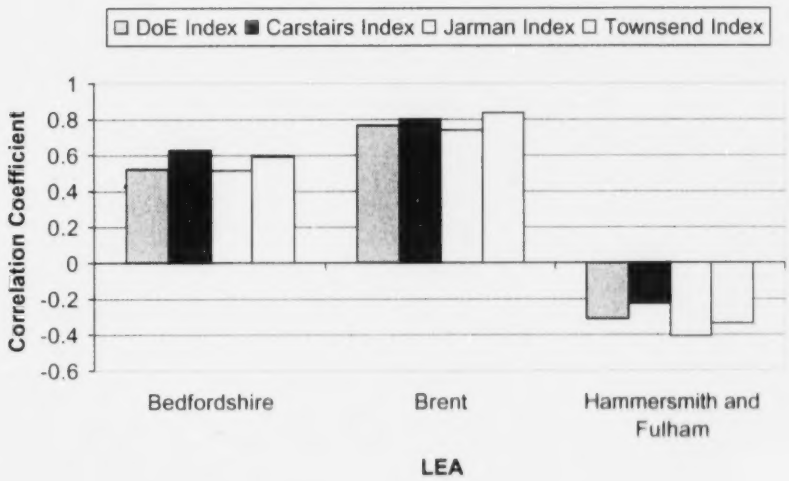
Figure 10: Percentage change in school segregation index scores between 1989 and 1999, for residual LEAs (see figure 9)



School locations

The discussion above has focused on levels of segregation within LEAs, irrespective of the raw figures. Figure 11, on the other hand, shows the correlation between school segregation and levels of residential deprivation in the respective locale of each school (as measured by four indices) for three example LEAs, Brent, Hammersmith and Fulham, and Bedfordshire. The method used here to determine the levels of residential poverty for a school locale is to use the indices of poverty for the Ward that the school is in.

Figure 11: Relationship between school segregation and levels of deprivation of school locale



As Figure 11 shows there can be varying degrees of correlation between school segregation and levels of deprivation for the respective school locales. This is best illustrated in Figures 12 to 14 - maps which show the Townsend index of deprivation by ED and the levels of school segregation (1993 Segregation Ratio). In Brent, the north-west to south-east residential change in deprivation mirrors the levels of segregation in schools. The schools in the north of the Borough have very low proportions of pupils eligible for FSM, whereas those in the south clearly have very high proportions of pupils eligible for FSM.

Figure 12: School segregation ratios and residential poverty, Brent

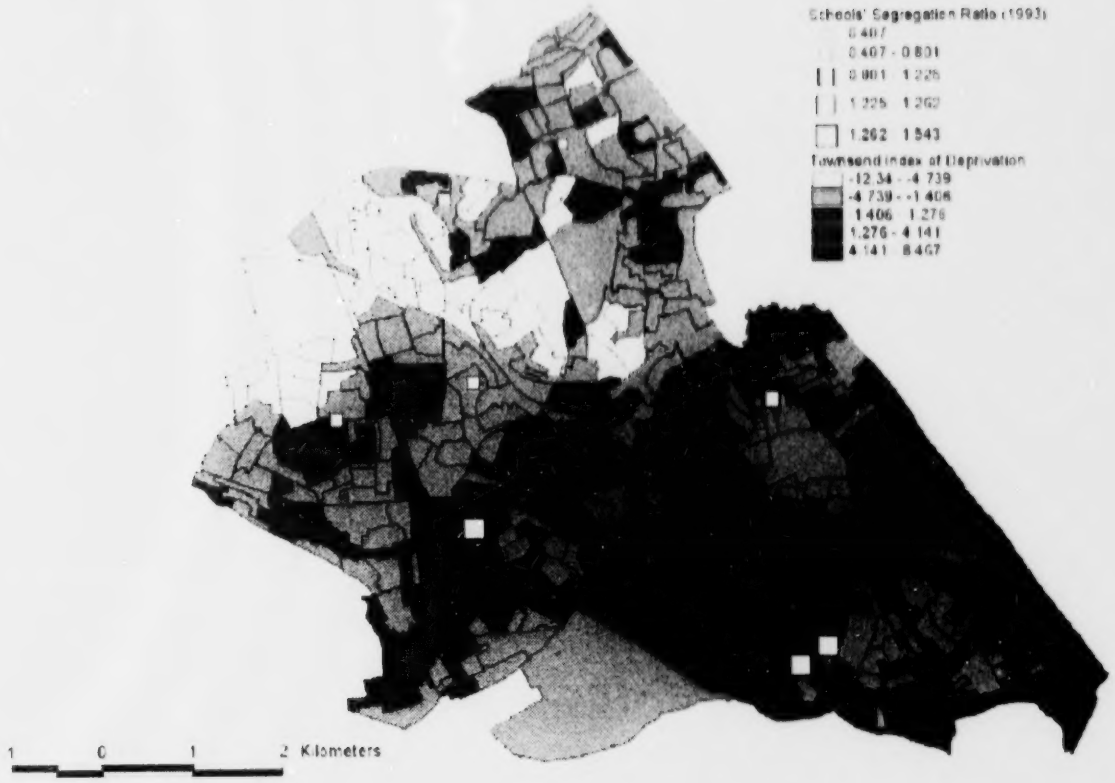
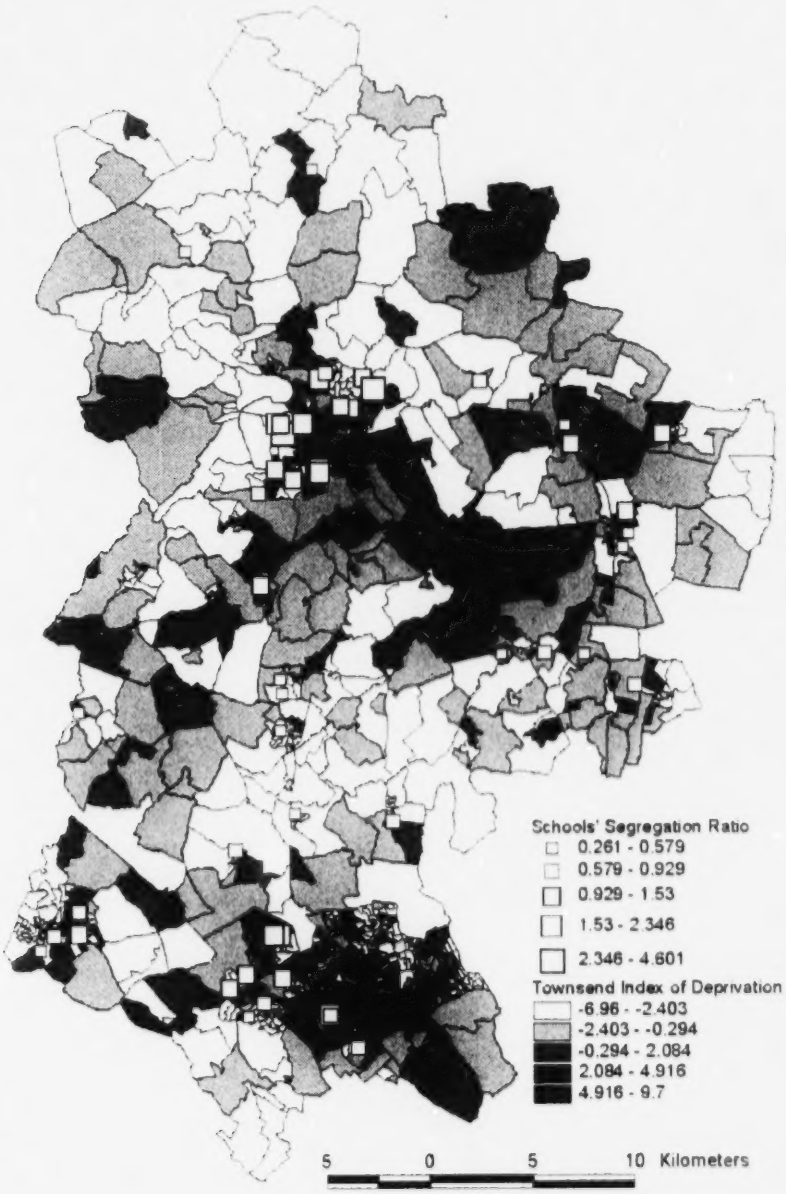


Figure 12: School segregation ratios and residential poverty, Hammersmith and Fulham

Figure 12: School segregation ratios and residential poverty, Bedfordshire



The example of Brent contrasts quite markedly with Hammersmith and Fulham, where, once again, there is a north-south residential poverty divide. However, in this instance the levels of school segregation are more evenly spread across the LEA.

The third example is that of Bedfordshire, where the relationship between residential poverty and school segregation is not as great as in Brent but stronger than that found in Hammersmith and Fulham (Figure 11). This example has been included to illustrate the urban-rural contrast. There is a strong relationship between the general levels of high school segregation and the general levels of high residential deprivation in urban areas. Similarly, there is a strong relationship between the general levels of low school segregation and the general levels of low residential deprivation in the rural areas. The reason that there is not a significant statistical correlation between school segregation and residential deprivation is the variation within the urban areas. On close examination the urban areas of Bedfordshire are not too dissimilar from the situation in Hammersmith and Fulham.

Conclusion

The relationship between residential development and schooling in England and Wales has always been of enormous interest to those concerned with the impact and effectiveness of education policy. However, few have attempted to provide an empirical link between these two fields of study. Our study, we believe, has begun to show how significant the relationship between residential development and schooling is, and, in particular, how residential differentiation is closely associated with the socio-economic segregation of school intakes. However, we have also shown that there is great variation in the significance of this relationship across LEAs. Some of this variation can be explained by the differential growth in school diversity, both from the origins of compulsory schooling up to present efforts to extend school diversity. The continued presence of Grammar schools upon the education landscape has ensured that intakes to schools will remain socially divisive. Also, as Bradford (1995) has discussed, the development of the more recent 'private' forms of state schooling, such as Grant Maintained schools and City Technology Colleges, have been spatially marked. The findings of this study would suggest that such

development has also guarnateed that socio-economic segregation of schools remains relatively high.

For many areas of England and Wales the impact of residential differentiation and school diversity can explain the social mismatch of secondary school intakes. However, we have provided a number of detailed examples, such as Knowsley, Buckinghamshire, Bedfordshire and Hammersmith and Fulham LEAs, where school intakes are unrelated to the residential differentiation of the LEA, the residential characteristics of the schools' locale, nor the characteristics of the schools themselves.

This is the point we return to the primary aim of our study, that is to what extent has the introduction of market principles, and the way schools and LEAs have responded, changed pre-exisiting between-school socio-economic segregation. It could be argued that the examples presented here may provide the clearest indication yet of the impact of open enrolment, other admissions legislation and admissions procedures upon school intakes. As we have tried to suggest throughout this paper, there appears to be little significant impact of this in many areas of England and Wales. However, further investigation focussing upon LEAs that deviate dramatically from their 'expected' levels of school segregation could begin to show quite clearly how the current reforms in education have impacted upon the social composition of schools. This project has already begun to show that there are great contrasts in the way LEAs have interpreted the new admissions legislation. We have also suggested that the impact of the reforms have varied over time, due to a number of demographic and political factors. Only by gradually piecing together the many elements imbued in the current organisation of schooling is it possible then to unpick the real effects of a market form in education provision.

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